

OPPORTUNITY

What have previous studies demonstrated about the potential for electrochromic (EC) windows?

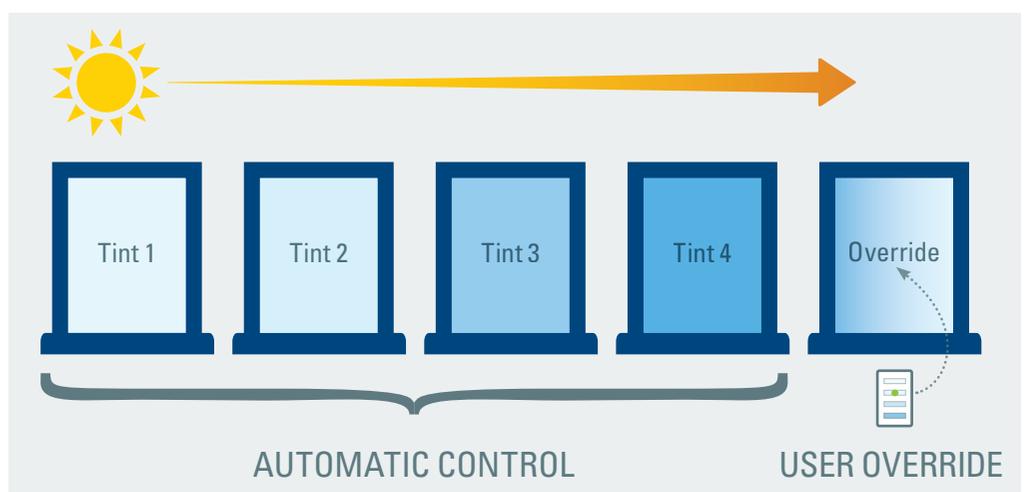
REDUCED

- HEAT GAIN AND COOLING ENERGY¹
- LIGHTING ENERGY²
- GLARE³

TECHNOLOGY

How do EC windows work?

WINDOWS TINT IN RESPONSE TO EXTERNAL CONDITIONS OR USER OVERRIDE



M&V

Where did Measurement and Verification occur?

LAWRENCE BERKELEY NATIONAL LABORATORY assessed occupant satisfaction with EC windows in two buildings with curtain-wall construction—the 911 Federal Building in Portland, Oregon and the John E. Moss Federal Building in Sacramento, California.

RESULTS

How did EC windows perform in M&V?

63-92% OCCUPANT PREFERENCE OVER EXISTING LOW-E⁴

However, implementations that both satisfy occupants and meet competing performance requirements are challenging and take time.⁵

CONTROL BASELINE CONDITIONS AND OCCUPANT BEHAVIOR DETERMINE SAVINGS

In Sacramento, most blinds remained lowered and darker tint levels predominated, resulting in a 62% increase in lighting energy. In Portland, 40% more blinds were left raised and lighter tint levels predominated, resulting in 36% lighting energy savings but a 2% HVAC increase.⁶

NOT COST-EFFECTIVE FOR GENERAL OFFICE SPACE BASED ON ENERGY SAVINGS ALONE⁷

Energy savings did not cover increased costs—in Portland, the incremental difference between installing spectrally selective low-e windows and EC windows was \$37/ft².

DEPLOYMENT

Where does M&V recommend deploying EC windows?

FACILITIES WHERE OUTSIDE VIEWS ARE CRITICAL

A previous GPG study recommended EC windows where glare control is required but blinds would interfere with mission, such as Land Ports of Entry.

EC windows also could enhance architectural features that provide a connection with the outdoors, such as skylights and atriums, though this has not been evaluated.

¹A Pilot Demonstration of Electrochromic and Thermochromic Windows in the Denver Federal Center, Eleanor S. Lee (LBNL), March 2014, p.4 ²Ibid, p.1 ³Electrochromic Window Demonstration at the Donna Land Port of Entry, Luís L. Fernandes (LBNL), May 2015, p.37 ⁴Electrochromic Window Demonstration at the John E. Moss Federal Building, Sacramento, Luís L. Fernandes (LBNL), August 2017, p.54 and Electrochromic Window Demonstration at the 911 Federal Building, Portland Oregon, Eleanor S. Lee (LBNL), August 2017, p.8 ⁵Ibid, p.8 and p.136 ⁶Ibid, p.3 and p.7 ⁷Ibid, p.101 and p.7